

Massachusetts: *Springfield Armory, 79°; Springfield, 77°; Thatcher's Island, 20°; *South Lee and *Somerset, 18°. *Rhode Island*: *Fort Adams, 64° and 24°; Newport, 63° and 26°. *Connecticut*: *Southington, 78°; New Haven, 75°; New London, 24°; *Southington, 19°. *New York*: *Ardenia, 81°; New York City, 76°; Rochester and Buffalo, 20°; *Schroon Lake and *Plattsburg Barracks, 16°. *New Jersey*: *Dodge Mines, 87°; Barnegat, 79°; Atlantic City, 24°; *New Lisbon and *Vineland, 22°. *Pennsylvania*: Pittsburgh, 84°; Erie, 26°; *Franklin, 15°. *Delaware*: Delaware Breakwaire, 79° and 32°; *Dover, 32°. *Maryland*: *Sandy Springs, 85°; Baltimore, 80° and 30°; *Woodstock, 23°. *District of Columbia*: Washington, 82° and 28°. *Virginia*: *Accotink, 90°; Norfolk, 84° and 27°; *Wytheville, 23°. *West Virginia*: *Helvetia, 82° and 15°; Morgantown, 81° and 28°. *North Carolina*: Wilmington and *Weldon, 90°; Charlotte and Kittyhawk, 33°; *Sulphur Springs, 25°. *South Carolina*: Charleston, 85° and 33°. *Georgia*: *Gainesville, 92°; Augusta and Savannah, 88°; Atlanta and Augusta, 36°; *McPherson Barracks, 29°. *Florida*: *Houston, 96°; Jacksonville, 91° and 42°; *St. Augustine, 41°. *Alabama*: Montgomery, 90° and 40°. *Louisiana*: *Okalooska, 94° and 35°; Shreveport, 93° and 40°. *Arkansas*: *Mount Ida, 95° and 32°; Little Rock, 94° and 43°. *Texas*: Eagle Pass and Rio Grande City, 105°; Fort Elliott, 26°; *Fort Concho, 25°. *Tennessee*: *Ashwood, 89°; Chattanooga, 88°; Knoxville and *Ashwood, 30°. *Kentucky*: Louisville, 87° and 31°; *Bowling Green, 30°. *Ohio*: *Cincinnati, 87°; Cincinnati, 83°; Cleveland, 27°; *Wooster and *Westerville, 22°. *Indiana*: *Laconia, 87°; Indianapolis, 83° and 27°; *Vevay, 24°. *Illinois*: *Mount Sterling, 86°; Cairo, 83°; Chicago, 27°; *Riley, 20°. *Michigan*: *Hudson, 80°; Port Huron, 73°; Alpena, 14°; *Fort Brady, 4°. *Wisconsin*: *Beloit, 80; Madison, 78° and 23°; *Neillsville, 18°. *Missouri*: *Corning, 94°; St. Louis, 86° and 30°; *Pierce City, 26°. *Iowa*: *Glenwood, 92°; Des Moines, 84°; Dubuque and Des Moines, 26°; *Logan, 15°. *Minnesota*: Breckenridge, 80° and 13°. *Indian Territory*: Fort Sill, 96°; Fort Gibson, 34°. *Kansas*: *Holton and *Cedar Vale, 94°; Dodge City, 92° and 24°. *Nebraska*: *Howard, 97°; North Platte, 90° and 20°; *Camp Sheridan, 15°. *Dakota*: *Fort Hale, 90°; Yankton, 82°; Pembina, —3°. *New Mexico*: Socorro, 80°; Santa Fé, 17°; *Fort Union, 14°. *Colorado*: Denver, 77° and 20°; *Fort Garland, 10°; Pike's Peak, 32° and —9°. *Wyoming*: *Fort Fetterman, 77°; Cheyenne, 73° and 15°; *Fort Fred Steele, 10°. *Montana*: Fort Benton, 81°; Fort Assiniboine, —20°. *Idaho*: Boise City, 79° and 30°; *Fort Hall, 10°. *Utah*: Salt Lake City, 75° and 27°; *Camp Douglass, 75° and 23°. *Nevada*: *Fort McDermit, 80°; Winnemucca, 74° and 22°. *California*: *Fort Yuma, 96°; Red Bluff, 88°; Campo, 24°. *Oregon*: Umatilla, 89° and 29°; Roseburg, 29°. *Arizona*: Yuma, 94°; Fort Apache, 20°. *Washington Territory*: Olympia, 82° and 28°.

Those marked with a star (*) are reported by U. S. Army Post Surgeons or Voluntary Observers.

Ranges of Temperatures at Signal Service Stations.—The monthly ranges will appear from the maxima and minima just given. The greatest daily ranges vary in New England from 19° at Wood's Holl to 35° at Boston; Middle Atlantic States, 19° at Cape May to 41° at Albany; South Atlantic States, 17° at Cape Lookout to 34° at Augusta and Wilmington; Eastern Gulf States, 13° at Key West and 24° at Pensacola to 32° at Montgomery; Western Gulf States, 21° at Galveston to 35° at Corsicana; Tennessee and Ohio valley, 24° at Cairo to 48° at Pittsburgh; Lower Lake region, 29° at Oswego to 41° at Cleveland; Upper Lake region, 24° at Grand Haven to 39° at Milwaukee; Upper Mississippi valley, 30° at La Crosse to 43° at Des Moines; Red River of the North valley, 42° at Pembina and 50° at Breckenridge; Missouri valley, 30° at Leavenworth to 51° at Fort Buford, and 53° at Omaha; Rio Grande valley, 31° at Rio Grande city to 45° at Eagle Pass; Eastern Rocky Mountain Slope, 33° at Virginia City to 53° at North Platte, and 54° at Fort Elliott; Plateau Districts, 33° at Boise City and Salt Lake City, 42° at Santa Fe; Pacific slope, 19° at San Francisco to 36° at Red Bluff.

Frosts.—Freezing temperatures were occasionally reported from Signal Service Stations as follows: Northern Pacific coast region, till 8th; Plateau districts, except southern Arizona, till 29th; along central and northern Rocky Mountain slope, and, north of 42nd parallel, eastward to the Atlantic Ocean, throughout month; east of Mississippi valley and north of 33rd parallel, till 12th; northern Ohio and Pennsylvania, till 30th. The following cases of interest are noted: *Alabama*: Heavy frost, 11th to 14th, killing vegetables, injuring fruit, corn, wheat and cotton at Troy, Greensboro, Blountsville, Wetumpka and other places. *Delaware*: 11th, general and severe throughout peninsula, seriously damaging peach blossoms. *Georgia*: 9th to 12th, severe, killing fruit and vegetables and damaging much cotton in northern half of State. *Kentucky and Tennessee*: 9th to 12th, severe, killing fruit and vegetables and injuring wheat. *Louisiana*: Okalooska, 9th. *Mississippi*: Vicksburg and Fayette, 9th and 10th. *Ohio*: 30th, damaging gardens and fruit somewhat. *Texas*: 8th and 9th, general in interior of State as far south as Castroville and Uvalde. *Arizona*: Burkes, 19th. *California* near Mt. St. Helena, 18th destroying peach crop first time in 16 years.

Ice was general north of parallel 40°. The following cases are noted as of interest: *Georgia*: Forsyth, 13th; Augusta, 10th, thin, in country near. *North Carolina*: Weldon and Wilmington, 12th; Charlotte, Statesville and Lenoir, 12th and 13th. *Indiana*: Logansport, 30th. *Tennessee*: Ashwood, 9th. *Virginia*: Walnut Grove, Johnstown and Mt. Solon, 12th. *New Jersey*: Newark, 30th. *Kansas*: Holton, 27th.

PRECIPITATION.

The general distribution of the rain-fall, including melted snow, for April, 1880, is illustrated upon chart No. III, as accurately as possible from about 500 reports. On the chart is given average precipitation for April. As will appear from that table, slight deficiencies are reported from Minnesota, the Eastern Gulf and Middle Atlantic States, and a slight excess from the Western Gulf States. Deficiencies of from one

to two inches are reported from New England, Tennessee, the South Atlantic States, Florida and the Missouri valley. An excess of one and a half inch is reported from the Lake region and the Ohio valley, and of two and a half inches from the St. Lawrence valley. On the Pacific coast the rainfall has been excessive in California, particularly in the central valleys. Over the Middle Pacific Coast region the precipitation was five times the amount of the April mean, being 7.86 above the normal.

Specially Heavy Rains.—1st, New Ulm, Tex., 1.12 in 4 hours, 15 min.; Brackettsville, Tex., 1.61 in 2 hours, 20 min. 1st and 2nd, Auburn, Cal., 2.10; Shasta, Cal., 2.70. 2nd and 3rd, San Buenaventura, Cal., 1.95 in 36 hours; Highlands, N. C., 3.00 in 29 hours. 3rd, Chattanooga, Tenn., 3.09 in 16 hours; Point Pleasant, La., 2.00 in 5 hours; Decatur, Ala., 2.00. 3rd and 4th, Gainesville, Ga., 2.30; Ellsworth, N. C., 2.50 in 25 hours; Thatcher's Island, 2.66 in 13 hours. 4th, Wellsboro, Pa., 1.35 in 2 hours, 40 min. 7th, Corsicana, 2.79 of which 2.35 in 8 hours. 7th and 8th, Vicksburg, 3.09 in 24 hours; Point Pleasant, La., 3.01. 14th to 16th, Mendocino, Cal., 4.00; Point Arenas, Cal., 3.00. 15th and 16th, Evansville, Ind., 3.30; 16th, Ft. Barrancas, Fla., 2.24 in 4 hours. 15th, San Francisco, Cal., 1.33; Louisville, Ky., 2.28 of which 1.84 fell in 2 hours and 45 min. 14th and 15th, New Harmony, Ind., 2.40; Point Pleasant, La., 4.01 in 8 hours; Fayette, Miss., 15th and 16th, 9.00 in 8 hours. 16th, Louisville, Ky., 1.78 in 6 hours; Vevay, Ind., 1.25 in 4 hours; Bowling Green, Ky., 2.04; St. Meinard, Ind., 1.95 in 6 hours; Pensacola, Fla., 2.30 in 8 hours; Mt. Auburn, Ohio, 1.63 in 2 hours; Wellsboro, Pa., 1.10 in 1 hour and 50 min. 18th, Madison, Wis., 2.15 in 6 hours. 19th, Memphis, 1.79 in 2 hours; Ft. Smith, Ark., 2.18; Little Rock, 1.23 in 4 hours; Princeton, Cal., 19th and 20th, 3.63; Red Bluff, 19th to 21st, 4.47. 20th, Kittyhawk, N. C., 2.15 in 3 hours; Corsicana, 1.30 in 3 hours; 19th and 20th, Green Spring, Ala., 3.82 in 9 hours; New Orleans, 3.18 in 24 hours. 20th and 21st, San Francisco, 3.20; Mt. St. Helena, Cal., 14.70; Sacramento, Cal., 8.37, of which 6.35 in 16 hours; Healdsburg, Cal., 9.73 in 48 hours; Santa Rosa, Cal., 6.70 in 48 hours; San Luis Obispo, Cal., 3.00 in 36 hours; Grass Valley, Cal., 4.50 in 18 hours; Georgetown, Cal., 4.00 in 24 hours; Nevada City, Cal., 5.20 in 24 hours, and "April to date, 22.98 inches, being six times the average for April"; Forest City, Cal., 6.54 in 48 hours; Modesto, 7.00 in 48 hours; Tomales, Cal., 5.02 in 40 hours. 23rd, Georgetown, Cal., "April to date 25.50 inches." 23rd, North Lewisburg, Ohio, 3.10 in 3½ hours; New Corydon, Ind., 3.79 in 11 hours. 23rd and 24th, Norwalk, Ohio, 2.51; Bellefontaine, Ohio, 3.50; Augusta, Ga., 1.00 in 1 hour; Newton, Ia., over 4.00 inches. 24th, Krokuk, 2.45 in 8½ hours; Vevay, Ind., 1.10 in 1 hour; Pierce City, Mo., 1.00 in 1 hour. 24th to 26th, Wellsboro, Pa., 4.82. 24th and 25th, Indianapolis, 3.03, of which 1.17 fell in 5 hours; Bethel, Ohio, 2.75. 25th, Vevay, Ind., 2.20 in 12 hours; Ringgold, Ohio, 0.80 in 12 min. 26th Point Pleasant, La., 2.01 in 10 hours; 25th and 26th, Mt. Auburn, Ohio, 2.07. 28th, Shreveport, 2.05 in 8 hours; Brackettsville, Tex., 2.05 in 6 hours; San Antonio, Tex., 2.79 in 1½ hours; Castroville, Tex., 1.73 in 3½ hours; Mesquite, Tex., 2.00; Mt. Ida, Ark., 28th and 29th, 2.05 in 25 hours; Highlands, N. C., 28th and 29th, 2.60 in 15 hours; Charlotte, N. C., 2.19; Washington, D. C., 2.05. 29th, Lynchburg, 2.20; Ellsworth, N. C., 3.50 in 12 hours; Point Pleasant, La., 2.00 in 2 hours.

Largest Monthly Rain-falls, including melted snow.—Georgetown, Cal., 25.50 in.; Shasta and Healdsburg, Cal., over 18.00 in.; Sacramento, Cal., 14.20 in.; Fayette, Miss., 13.40 in.; Cincinnati, (College Hill) 10.50 in.; Chattanooga, Tenn., 10.37 in.; Green Springs, Ala., 10.15 in.; Murphy, N. C., 9.30 in.; New Corydon, Ind., 9.08 in.; Kalamazoo, Mich., 8.00 in.

Smallest Monthly Rain-falls, including melted snow.—Fort Yuma, Cal., 0.00; Yuma, Ariz., and Fort Union, N. M., trace; Brownsville, Tex., 0.01 in.; Tucson and Camp Grant, Ariz., 0.04 in.; Socorro and Santa Fe, N. M., 0.05 in.; El Paso, Tex., 0.10 in.; Dodge City, Dak., 0.11 in.; Fort Davis, Tex., 0.14 in.; Phoenix and Burkes, Ariz., 0.15 in.; North Platte and Fort Elliott, Tex., 0.16 in.; Cheyenne, W. T. 0.17 in.; Edinburg, Tex., 0.19 in.; Wickenburg, Ariz., 0.25 in.; Camp Verde, Ariz., 0.27 in.; Olivet, Dak., and Denver, Col., 0.31 in.; Key West, Fla., 0.33 in.; Vail, Io., 0.32 in.; Yankton, Dak., 0.40 in.

Rainy Days.—The number of days on which rain or snow has fallen, varies as follows: New England, 2 to 23; Middle Atlantic States, 8 to 20; South Atlantic States, 9 to 15; Eastern Gulf States, 4 to 13; Western Gulf States, 8 to 13; Lower Lake region, 17 to 21; Upper Lake region, 12 to 20; Ohio valley and Tennessee, 10 to 17; Upper Mississippi valley, 7 to 12; Missouri valley, 4 to 9; Red River of the North valley, 5 to 12; Eastern Rocky Mountain Slope, 1 to 10; Texas, 0 to 9; Rocky Mountains, 2 to 11; Middle Plateau, 1 to 14; California, 16 to 18; Oregon, 15 to 18.

Cloudy Days.—The number varies in New England from 6 to 16; Middle Atlantic States, 4 to 11; South Atlantic States, 4 to 13; Eastern Gulf States, 0 to 16; Western Gulf States, 5 to 16; Lower Lake region, 10 to 16; Upper Lake region, 8 to 15; Ohio valley and Tennessee, 5 to 13; Upper Mississippi valley, 4 to 10; Missouri valley, 4 to 10; Red River of the North valley, 10; Eastern Rocky Mountain Slope, 3 to 9; Texas, 4 to 14; Rocky Mountains, 3 to 11; Middle Plateau, 0 to 15; California 9 to 13.

Droughts prevailed in central and western Kansas and in the interior of Texas, until ended by the heavy rains of the 27th to 30th.

Floods.—The following notes have been gathered regarding damage in Lower Mississippi valley from high water during latter part of March and during April. *March 23rd:* Much land overflowed in Crittenton Co., Ark. Many cattle drowned or starved. Many houses uninhabitable. Along White river much land overflowed as far up as St. Charles; a large amount of stock drowned. Levee at O. K. landing broke March 27th; crevasse 40 feet wide. The Sharp crevasse, 4 miles above Gretna, La., occurred April 1st; enlarged by 2nd to 70 feet wide with central depth of 15 feet. On 2nd 5,900 acres under water. Two culverts on Morgan railway, 8 miles from Algiers, washed out, interrupting travel. Main crevasse closed on 7th,

but slight breaks occurred on 9th and frequently to 30th. 10th, Water from Morganzia crevasse, in West Baton Rouge Parish, La., slowly encroaching on rear lands. Northern Texas railway continues inundated; between Vicksburg and Munroe 40 miles is traversed by skiffs, rest by rail; regular through trains not expected before May 1st. 16th, Crevasse on left bank of Bayou La Fourche, one mile below Thibodeau, La. Night 16th and 17th, levee broke on Tensas river near Stanton's plantation, submerging entire Black and Tensas river country. 17th, Frogmore, Concordia Parish, La.: "water has commenced falling; levees on Cross Bayou, above and below here have given away at several places. Moro and Dunbarton levees on Tensas river have given way, flooding the country for miles." Mineola, Texas, 1st, during previous night very heavy rain and remarkable rise in Sabine river; washouts on railway between Mineola and Tyler. 3rd, Toccoa Falls, Ga., heaviest rain for years; about 12 miles air-line railway track washed out and bridge over Tugalo river carried away. 18th, Freshet in Bogue Chitto, submerging 6 miles track of Jackson railway and interrupting travel between Brookhaven and Coon City, Miss. 25th, Farmers City, Ill., creeks higher than ever before known. Princeton, Cal., 22nd, Sacramento river, 23 ft. 1 in. above zero, highest water ever known. 23rd, much damage in Sacramento, San Joaquin, Santa Clara, Napa, and other valleys in central and western California, from very heavy rains, 20th-23rd. 21st, Yolo levee, near Sacramento, broke. Peoria, Ill., 24th, city flooded, many buildings damaged; numerous washouts and land-slides, interrupting railway travel. Litchfield, Mich., 30th, St. Joseph river highest for 25 years. Fayette, Miss., 16th, streams highest ever seen; crops, bridges and stock swept away, damage very great.

Hail.—Hail-storms have been especially frequent and cannot be enumerated in detail. The following storms were unusually severe or interesting from the size of the hail-stones. *March* 31st, very violent in parts of Cowen and Dallas counties, Texas: near Plano the hail zone was 200 yards wide; the stones were as large as hickory nuts, and covered the ground like snow-drifts. *April* 1st, Ft. Ewell, Tex., violent, stones pierced tents and knocked shingles from roofs. 4th, Knoxville, Tenn., very severe, stones as large as partridge's eggs fell in great quantities. 6th, Spartansburg, S. C., "terrific, the severest since memorable storm of June, 1840. Some stones 6 inches in circumference. Much damage to glass, and to fruit trees." Denny's Cross Roads, S. C., "worst ever known in this section; lasting 20 minutes; stones from size of partridge to hen's eggs." 7th, Maxey's, Ga., several stones 12 inches in circumference; hail fell for 15 minutes, much like snow, a calm prevailing. Bairdstown, Ga., one stone weighed 2 pounds. 16th, Merced, Cal., heaviest for years. 17th, Fayetteville, Tenn., stones size of hen's eggs, weighing 4 to 6 ounces. 18th, Mentor, Ohio, stones as large as marbles. 22nd, Tama, Iowa, stones as large as english walnuts. 26th, Oakville, Ont., violent. Montgomery, N. Y., 6th, violent, doing much damage to buildings. 29th, Columbia, S. C., stones as large as hen's eggs. Gainesville, Ga., 4th, stones one inch in diameter; 6th, "size of chestnuts." Nora Springs, Iowa, 24th, of one to two inches in diameter, "soft, snowy texture." Fort Madison, Ia, 24th, size of quail's eggs. Point Pleasant, La., half-inch in diameter. Hudson, Mich., 3rd, "very severe, stones large as walnuts. Twenty-four picked up half-hour after falling weighed 72 oz. Fowls killed and farm houses damaged." Pierce City, Mo., 24th, stones 1.5 by 1.2 in. in diameter. Newark, N. J., 5th, $\frac{1}{2}$ to $\frac{3}{4}$ in. in diameter. Franklin, Pa., 4th, large, breaking much glass. Wytheville, Va., 25th, average diameter, $\frac{1}{2}$ in., of some $\frac{3}{4}$ inch. Red Bluff, 20th, $\frac{3}{4}$ in. in diameter, covering ground. Fort Sill, 17th, $\frac{1}{2}$ in. in diameter. Castroville, Tex., 28th and Mason, Tex., 6th, "size of hen's eggs." Near Mt. Airy, Ga., 3rd, "reported as large as a man's fist." Savannah, Ga., 4th, some 1 $\frac{1}{2}$ in. in diameter; much glass broken in city; gardens seriously damaged. Augusta, 6th, size of partridge eggs, covered the ground; "this hail-storm is reported to have killed young stock in Orangeburg, Co., S. C."

RELATIVE HUMIDITY.

The percentages of mean relative humidity for the month range as follows: New England, from 57.6 to 85.5; Middle Atlantic States, 47.2 to 84.1; South Atlantic States, 60.4 to 79.2; Eastern Gulf States, 67.6 to 77.6; Western Gulf States, 59.3 to 79.5; Ohio valley and Tennessee, 53.6 to 70.0; Lower Lake region, 61.9 to 66.6; Upper Lake region, 62.9 to 72.6; Upper Mississippi valley, 53.7 to 62.0; Missouri valley, 45.9 to 68.4; Red River of the North valley, 72.8 to 75.0; Eastern Rocky Mountain Slope, 23.0 to 72; Western Plateau, 19.0 to 54.8; California, 67.5 to 78.9 Oregon, 52.0 to 70. *High stations* report the following averages not corrected for altitude: Pike's Peak, 68.9; Mt. Washington, 85.0 per cent.

WINDS.

Total Movement of the Air.—The following are among the *largest* total movements in various sections of the country: Pike's Peak, 16,279; Portsmouth, N. C., 13,560; Delaware Breakwater, 13,958 miles; Wood's Holl, 12,491; North Platte, 11,948; Indianola, 11,845; Ft. Elliott, Tex., 11,050; Grand Haven, 10,875; Bismarck, 10,575; St. Louis, 9,499; Erie, 9,491; Red Bluff, 8,621; Cairo, 7,671; Punta Rasa, 7,889. Frost-work prevented a complete record on Mt. Washington. The *smallest* in various districts are: El Paso, 2,546; Roseburg, 2,569; Augusta, 2,787; Uvade, 3,167; Tuscon, 3,448; Lynchburg, 3,794; Toledo, 4,083; Nashville, 4,140; Montgomery, 4,733; Little Rock, 5,118; Springfield, Mass., 5,163; Baltimore, 5,398; Dubuque, 6,203; Escanaba, 6,804.

Local Storms.—Violent local storms, in unusual numbers, occurred during *April*. Tornadoes, causing loss of life or doing serious injury to property, were reported from Kansas and Louisiana on the 2nd; from Georgia on the 3rd, 4th and 24th; from Missouri, Arkansas, Iowa, Illinois and Wisconsin on the 18th and 24th; from Illinois on the 23rd; from Illinois and Missouri on the 24th, and from Mississippi on the 25th, 29th, 30th. The following details have been gathered from reports made by Signal Service and voluntary observers